PTO: 2010-2446

Japanese Published Unexamined Utility Model Patent Application (U) No.51-063032, published May 18, 1976; Application Filing No.49-136622, filed November 13, 1974; Inventor(s): Akio Yoshida; Assignee: Komatsu Works, Inc.; Japanese Title: Engine Cooling Devices

---

Engine Cooling Devices

CLAIM(S)

An engine cooling device characterized in that an engine 5 and a radiator 8 are installed on the front and rear sides of a main frame 4, and in that a pipe 15 connecting the cooling system of said engine 5 and radiator 8 is installed inside the longitudinal through-hole 11 of main frame 4 via an elastic body 14 to be slightly movable in the longitudinal direction.

DETAILED DESCRIPTION OF THE INVENTION

The present invention pertains to an engine cooling device mounted on loading vehicles, such as a bulldozer shovel and a tier shovel.

Generally, a bulldozer shovel tries to dig and load dirt by a bucket mounted on the front side of the vehicle body to be able to move up and down, and is structured to have an engine and a radiator mounted on the front side of the vehicle.

Therefore, if a high output power engine is mounted to raise the loading capacity of bulldozer shovel, the engine cooling water needs to be increased, which inevitably requires a higher capacity radiator and the radiator results in a larger size and heavier weight.

Accordingly, the weight center of the vehicle comes closer to the front side and the loading capacity of bucket cannot be increased in order to preserve the vehicle stability, which is a problem. Also, there are problems that visibility on the front side becomes poor making it more difficult to perform the digging and loading operations and that noise from a fan gets louder due to a larger size of the cool air-generating fan.

It was considered to install the radiator on the rear side of the vehicle to bring the vehicle weight center closer to the rear side in order to reinforce the stabilization. In such a case, since the engine is on the front side of the vehicle and the radiator is on the rear side, the position of the connection pipe for the engine cooling system and radiator becomes a major problem. In other words, the pipe stands in a way and is exposed to a danger of being damaged when hit by rocks, which is again a problem.

The present invention was produced to solve the aforementioned problems, and attempts to present the engine cooling device, wherein the pipe connecting the engine cooling system and the radiator is installed in the main frame so that it does not stand in a way and is not damaged even if rocks hit it in case when the engine is mounted on the front side of the vehicle and the radiator on the rear side.

The embodiment example of the present invention is explained below with reference to the figures.

On the vehicle body 1, the bucket 2 is mounted to be movable up and down via a lift arm and is positioned on the front side of the vehicle body 1. The vehicle body 1 has the main frame shaped in a コ-character in its top view. The engine 5 is mounted on the front side of this main frame 4 and on the rear side of the main frame 4, the rear radiator 8 is mounted via the supporting member 7.

The aforementioned frame 4 is formed into the コ-character shape in its top view by the base section 9 and a pair of right and left beam sections 10 and 10. A through-hole 11 is made in a longitudinal direction in each of the right and left beam sections, and in each through-hole 11, the first, second and the third attachment pieces 12, 12, and 12 are screwed into and locked with the bolt 13’. The first pipe 15 is secured inside the multiple holes 13 of the first attachment piece 12_1, and the second pipes 15_1 and 15_2 penetrate and are supported via the O ring 14 in multiple holes 13 of the second and third attachment pieces 12_2 and 12_3. The one end of this first pipe 15_1 is engaged in the joint 17 inserted, via the O ring 16, into the bracket 9a installed on the base section 9. The other end of pipe 15_1 and the one end of second pipe 15_2 are connected via a rubber joint 6, while the other end of second pipe 15_2 is engaged in the joint 20' inserted via the O ring 19 into the cover body 18 inserted and locked in the opening section at the front end of beam section 10.

In the base section 9, are made a pair of right and left water grooves 20 and 20, and the opened section at one end of each water groove is opened and connected to each of joint 17, while the opening at the other end of water groove 20 is connected to the intake port 8a of rear radiator 8 via the pipe 21, and the discharge port 8 of the rear radiator 8 is connected to the opening at the other end of other water groove 20 via the pipe 22.

One of the second pipes 15_2 out of the right and left second pipes 15_2 is connected to the water groove 23 and other second pipe 15_2 is connected to the water groove 24.

On the other hand, the water manifold 25 of engine 5 is, via the thermostat 26, connected to one of the water groove 23 and water pump 27. The intake side of the water pump 27 is connected to the water groove 24, while the discharge side is, via the engine oil cooler 28, connected to the water manifold 25.

By the aforementioned structure, the front visibility is improved without reducing the cooling water, and the loading capacity of the bucket can be increased since the weight center of the vehicle come closer to the rear section.

In addition, since the engine 5 and the rear radiator 8 are connected via the pipe 15 penetrating through inside the beam 10 of main frame 4 and the water groove 20 of base 9, the effects of hydraulic pipe and operator cooler not shown in the figures can be produced. Also, since the pipe is not exposed to the outside, there is no problem of being hit by rocks and damaged, and since there is no need of space for installing the pipe, there is no need of considering the space for installation.

Since the first and second pipes 15_1 and 15_2 are mounted on the attachment piece 12 via the O ring 14, even if the main frame 4 is bent, the bending can be absorbed by the O ring 14. Since an external force is not acted upon the first and second pipes 15_1 and 15_2, the damage to the first and second pipes 15_1 and 15_2 can be prevented.

In addition, since the first and second pipes 15_1 and 15_2 are mounted on the joints 17 and 20’ to be able to freely slide, even when the first and second pipes 15_1 and 15_2 extend in the longitudinal direction by thermal expansion, the external force does not act upon the first and second pipes 15_1 and 15_2, preventing the damage to them.

Also, the first and second pipes 15_1 and 15_2 are mounted on the attachment piece 12; their one ends are inserted into the joints 17 and 20' and the other ends on the opposite sides are connected to the rubber joint 6, so disintegrating and integrating become easy.

The cooling device of the present invention has the aforementioned structure, the pipe 15 connecting the radiator 8 and engine 5 does not stand in a way of installing the other components and is not damaged when hit by rocks. Also, the device is doubled as an operator cooler effect.

In addition, the pipe 15 is slightly movable in the longitudinal direction in the longitudinal through-hole 11 of the main frame 4 and is installed with elasticity via the elastic body 14, so the external force does not affect the pipe 15 even if the pipe 15 is thermally expanded and even if the main frame 4 is bent, the pipe is not affected by the external force, preventing the damage to the pipe 15.

BRIEF DESCRIPTION OF THE DRAWINGS

The figures show the embodiment example of the present invention. Fig. 1 shows the entire configuration. Fig. 2 shows a top view of the main frame. Fig. 3 shows an anterior view of Fig. 2. Fig. 4 shows an expanded partial cut-away view of Fig. 3. Fig. 5 shows the V-V section of Fig. 4. Fig. 6 shows the VI – VI section of Fig. 4. Fig. 7 shows the VII – VII section of Fig. 6. Fig. 8 shows the VIII – VIII section of Fig. 2.

4. main frame

5. engine

8. radiator

11. through hole

14. elastic body

15. pipe

[T. Note: The drawings cannot be provided to the translation since the West Database does not contain the Utility Model Patent Applications.]

Translations
U. S. Patent and Trademark Office
2/26/10
Akiko Smith